



Project Summary

Proceedings: Multipollutant Sorbent Reactivity Workshop

S.V. Krishnan

The report is a compilation of technical papers and visual aids presented by representatives of industry, academia, and government agencies at a workshop on multipollutant sorbent reactivity at the U.S. Environmental Protection Agency's (EPA's) Environmental Research Center in Research Triangle Park, NC, July 19–20, 1994. There were 16 technical presentations in three sessions, and a panel discussion between six research experts. The workshop was a forum for the exchange of ideas and information on the use of sorbents to control air emissions of acid gases (sulfur dioxide, nitrogen oxides, and hydrogen chloride), mercury and dioxins, and toxic metals, primarily from fossil fuel combustion. A secondary purpose for conducting the workshop was to help guide EPA's research planning activities. A general theme of the workshop was that a strategy of controlling many pollutants with a single system rather than systems to control individual pollutants should be a research goal. Some research needs cited were hazardous air pollutant removal by flue gas desulfurization systems, dioxin formation and control, mercury control, waste minimization, impact of ash recycling on metals partitioning, impact of urea and sorbents on other pollutants, high temperature filtration, impact of coal cleaning on metals partitioning, and modeling dispersion of sorbents in flue gas.

This Project Summary was developed by EPA's National Risk Management Research Laboratory, Research Triangle

Park, NC, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

The workshop on multipollutant sorbent reactivity was held in Research Triangle Park, NC, from July 19 to 20, 1994. It was sponsored by the U.S. Environmental Protection Agency's (EPA's) Air and Energy Engineering Research Laboratory (AEERL), recently redesignated the Air Pollution and Prevention Control Division of EPA's National Risk Management Research Laboratory.

The workshop provided for the exchange of information relating to control of acid gases—sulfur dioxide (SO₂), nitrogen oxides (NO_x), and hydrogen chloride (HCl)—mercury and dioxins, and metals, as well as addressed the ability of technologies used for the control of individual pollutants to control other pollutants.

Sixteen technical papers were presented in three sessions. In a fourth session, a panel of six experts summarized the workshop presentations and discussed the issues of multipollutant control using sorbents. The industry had a strong representation in the fourth session where futuristic goals were discussed.

Attendees and presenters were from government, academia, and industry. This provided a good blend between fundamental and applied research in terms of research results and direction for future research. The goal of the workshop, to provide a forum for the exchange of information between researchers and planners of research, was achieved.

The presenters chosen for this workshop were reputed experts in their areas (acid gas control, mercury and dioxin control, and metals control). They discussed their findings and suggested future research in all topics directed at controlling multiple pollutants employing existing technologies. For instance, dry injection of sorbents used for controlling SO₂ may perhaps curtail emissions of other acid gases, dioxins, and metals. The presentation materials and/or the papers submitted by the speakers are compiled in these proceedings.

The sessions, names of presenters, and title of their papers are

- Session 1
SO₂/NO_x/HCl (B.K. Gullett, Chair)
 - "Potential for NO_x Control Technologies to Control Multiple Pollutants," Kramlich, John C., University of Washington.
 - "Effect of Acid Gas Control Processes on Heavy Metal and Hydrocarbon Emissions," Silcox, Geoff, University of Utah.
 - "Dry Sorbent Processes for Removal of SO₂," Bjerle, Ingemar; Zhicheng Ye, University of Lund.
 - "Dispersion of Particles and Droplets: Limitations on Reactivity and the Control of Pollutants by Sorbent Injection," Smith, Philip J., University of Utah.
 - "NO₂ Absorption by Hydrated Calcium Silicate at High Relative Humidity," Rochelle, Gary T.; Nelli, Chris, University of Texas, Austin.
 - "Dispersion of Ultrafast Reaction Kinetics of Calcium-based Sorbents for Furnace Sorbent Injection Applications," Fan, L.-S., Ghosh-Dastidar, A., and Mahuli, S.K., Ohio State University.
- Session 2
Mercury/Dioxin (B.K. Gullett, Chair)
 - "Sorbent Injection for Dioxin/Furan Prevention and Mercury Control," Gullett, Brian K., U.S. EPA, AEERL; Krishnan, S.V., Acurex Environmental Corporation.
- "Mercury Control Options and Possible Extension to Other Pollutants," Chang, Ramsay, Electric Power Research Institute.
- "An Economic Alternative To Controlling Acid Gases, Mercury and Dioxin from MWCs," Babu, Manyam, Dravo Lime Company; Licata, Anthony, Licata Energy and Environmental Consultants, Inc.; Nethe, Lutz-Peter, Märker Umwelttechnik.
- "Control of Organics, Metals, and Acid Gases from Municipal Waste Combustors," Kilgroe, James D., U.S. EPA, AEERL.
- Session 3
Metals (W.P. Linak, Chair)
 - "Sorbent Capture of Nickel, Lead, and Cadmium in a Laboratory Swirl Flame Incinerator," Linak, William P., U.S. EPA, AEERL; Srivastava, Ravi K., Acurex Environmental Corporation; Wendt, Jost O., University of Arizona.
 - "Interactions of Toxic Metals with Matrix Constituents," Lighty, J.S.; Barton, R.G.; Silcox, G.D., University of Utah; Rink, K.K., Morton International; Kozinski, Janusz, McGill University; Gao, D., University of Utah; Eddings, E.G., Reaction Engineering International.
 - "Sorbents for Simultaneous Removal of Sulfur and Trace Metal Compounds," Wu, B.; Shadman, F., University of Arizona.
 - "Air Toxic Metals Control," Benson, Steven A.; Miller, Stanley J.; Pavlish, John, H., University of North Dakota.
 - "Evaluating the Effectiveness of Mineral-Based Additives as Sorbents in Metal Capture Using a Thermal Treatability Unit," Venkatesh, S; Lee, J., Acurex Environmental Corporation; Carroll, G., U.S. EPA, Risk Reduction Engineering Laboratory.
 - "Metal Capture by Various Sorbents During Fluidized Bed Incineration," Ho, T.C., Lamar University.
- Session 4
Summary Panel (W.R. Seeker, Chair)
 - "The Reactor Filter System for Multipollutant Control," Seeker, W. Randall, Widmer, Neil C.; Cole, Jerald A., Energy and Environmental Research Corporation.
 - "Control of Toxic Substances from a Coal-Fired Low Emission Boiler System," Reicker, Eric L., Riley Stoker Corporation.
 - "Research Needs for Multipollutant Sorbent Technology," Staudt, James E., Research-Cottrell.
 - "Integrated Air Pollution Control Technologies: Theory and Practice," Hofmann, John E., Nalco Fuel Tech.
 - "Multipollutant Sorbent Injection," Rini, Michael J., ABB Power Plant Laboratories.
 - "Control Options for Air Toxic Emissions from Coal-Fired Utilities," DeVito, Matthew S., CONSOL Inc.

An open discussion at the conclusion of Session 4 drew concerns, suggestions, and individual views including the need to control pollutants, the cost of controlling pollutants, and several control technologies.

In the need to control pollutants, it was felt that the cost effectiveness in reducing residual emissions after the application of maximum achievable control technology should be addressed, particularly, the cost effectiveness of mercury control. Among the existing technologies for particulate matter, SO₂, and NO_x, cost reduction was noted as key.

Several areas where study results were negligible were identified. Although most of these areas have been studied to some extent, further work in these areas was suggested. Some of the areas mentioned were hazardous air pollutant removal by flue gas desulfurization, dioxin formation and control, mercury control, waste minimization, impact of ash recycling on metal partitioning, impact of urea/sorbents on other pollutants, high temperature filtration, impact of coal cleaning on metals partitioning, and modeling dispersion of sorbents in flue gas. It was generally agreed that fundamental insights on the mechanisms in each of these areas need more focus.

S.V. Krishnan is with Acurex Environmental Corp., Research Triangle Park, NC 27709.

Norman Kaplan is the EPA Project Officer (see below).

The complete report, entitled "Proceedings: Multipollutant Sorbent Reactivity Workshop," (Order No. PB96-183868; Cost: \$57.00, subject to change) will be available only from

*National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Telephone: 703-487-4650*

The EPA Project Officer can be contacted at

*National Risk Management Research Laboratory
U.S. Environmental Protection Agency
Research Triangle Park, NC 27711*

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